

## Low Power Digital Correlator System for PATH Mission, Phase II

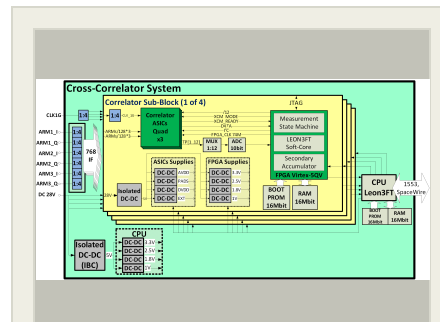
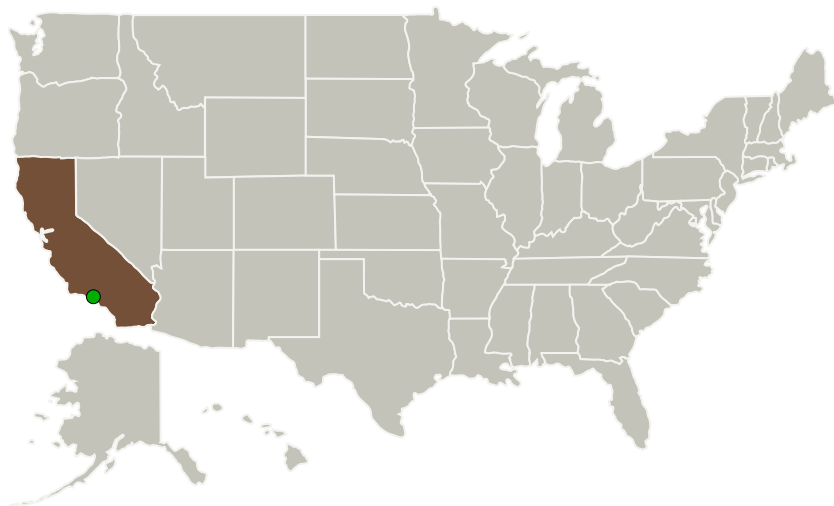
Completed Technology Project (2015 - 2018)



## Project Introduction

The NASA's PATH mission employs GeoSTAR spectral radiometer processing data from antenna consisting of three arms, each holding 128 microwave receivers. Each of the 384 receivers amplifies RF signals, and down-converts them to an intermediate frequency (IF). As a result, 768 in-phase (I) and quadrature (Q) signals are produced with a frequency of 10 to 500MHz. The IF signals have to be normalized and digitized with 1Gs/s sampling rate for further cross-correlation. Each signal from one arm of the receiver must be cross-correlated with all signals from the other two arms, therefore a system containing 196,000 parallel cross-correlation blocks is needed. Since the GeoSTAR is a space born instrument, low power dissipation and ensuring system reliability, through processing redundancy, are one of the most important requirements. A system assembled by using off-the-shelf components would be extremely power inefficient, bulky, and unreliable. Therefore, a system that is based on application specific integrated circuits (ASICs) is required. While working on the NASA's SBIR Phase II project "Low Power Cross-Correlator ASIC" (NNX13CP01C), Pacific Microchip Corp. has developed and fabricated an ASIC that includes 128-element array of 2-bit 1GS/s ADCs, and 4096 parallel cross-correlation cells. The ASIC was designed based on the GeoSTAR radiometer requirements, therefore it is intended to be the key component in the cross-correlator system which is being developed. The system will contain means correlation results further post-processing and control of ASICs.

## Primary U.S. Work Locations and Key Partners



Low Power Digital Correlator System for PATH Mission, Phase II Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
Pacific Microchip Corporation	Lead Organization	Industry	Culver City, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

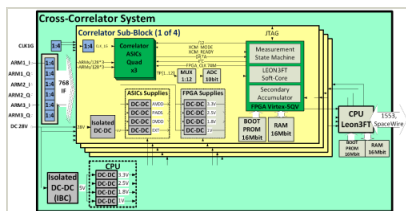
California

## Project Transitions

**May 2015:** Project Start**October 2018:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/137430>)

## Images

**Briefing Chart Image**

Low Power Digital Correlator System for PATH Mission, Phase II  
Briefing Chart Image  
(<https://techport.nasa.gov/image/127901>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Pacific Microchip Corporation

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Denis Zelenin

**Co-Investigator:**

Denis Zelenin

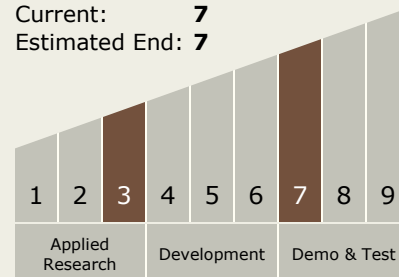
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### Technology Maturity (TRL)

Start: **3**  
Current: **7**  
Estimated End: **7**



### Technology Areas

#### Primary:

- TX08 Sensors and Instruments
  - └ TX08.3 In-Situ Instruments and Sensors
    - └ TX08.3.1 Field and Particle Detectors

### Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System